

## Missouri Department of Natural Resources Water Protection Program

Total Maximum Daily Loads (TMDLs)
for
Chlordane and Polychlorinated Biphenyls
in the
Missouri River

Completed: October 5, 2006

**Approved:** 

## Total Maximum Daily Loads (TMDLs) For the Missouri River

Pollutants: Chlordane and Polychlorinated Biphenyls (PCBs) in Fish Tissue

Name: Missouri River

Location: Across 25 counties: Atchison, Holt, Andrew, Buchanan, Platte, Clay, Jackson, Ray, Lafayette, Carroll, Saline, Chariton, Howard, Cooper, Moniteau, Boone, Cole, Callaway, Osage, Montgomery, Gasconade, Warren, Franklin, St. Charles and St. Louis

**Hydrologic Unit Codes (HUC):** 10240001, 10240005, 10240011, 10300101, 10300102, 10300200



Water Body Identification Numbers (WBID): (from the mouth at St. Louis to the Iowa border) 1604 (100 miles), 701 (129 miles), 356 (125 miles) and 226 (179 miles)

Missouri Steam Classification: The Missouri River is classified in the Missouri Water Quality Standards (WQS) as a Class P<sup>1</sup> stream

### Beneficial Uses for Missouri River<sup>2</sup>:

- Livestock and Wildlife Watering
- Protection of Aquatic Life and Human Health Fish Consumption
- Whole Body Contact Recreation, Category B
- Secondary Contact Recreation
- Irrigation
- Drinking Water Supply
- Industrial

Pollutant: Chlordane and PCBs in fish tissue

Size of Impaired Segment: 533 miles

Pollutant Source: Many point and nonpoint sources

TMDL Priority Ranking: High

<sup>&</sup>lt;sup>1</sup> Class P streams maintain permanent flow even in drought periods

<sup>&</sup>lt;sup>2</sup> For beneficial uses see 10 CSR 20-7.0310(C) and Table (H)

#### 1. Introduction

#### 1.1 Study Area Description:

The Missouri River is 2,565 mile long starting at its headwaters in the Jefferson, Madison and Gallatin Rivers, which converge near Three Forks, Montana, to form the Missouri River. The river flows north through mountainous canyons before emerging from the mountains near Great Falls, Montana. It flows east across the plains of Montana into North Dakota, then turns southeast flowing into South Dakota and along the north and eastern edge of Nebraska. The river forms part of Nebraska's border with South Dakota and nearly its entire boundary with Iowa, flowing past Sioux City and Omaha. The river forms the entire boundary between Nebraska and Missouri and part of the boundary between Missouri and Kansas. At Kansas City, the river turns eastward and flows across Missouri where it joins the Mississippi River just north of St. Louis. The Missouri River sub-basin is the largest sub-basin in the Mississippi River basin, covering more than 500,000 square miles.

The TMDL discussed in this report is for the portion of the Missouri River that begins on the border of Iowa and Missouri, approximately 10 miles north of Watson, Missouri, at River Mile 552 (Figure 1). Table A in the appendix provides a detailed description of the 25 sampling locations along the Missouri River shown in Figure 1. Land use for this 533-mile portion<sup>3</sup> of the Missouri River is shown in Figure 2. Within the impaired segments, three major tributaries enter the Missouri River. These tributaries are the Platte, Blue and Osage Rivers, and their confluences are at Missouri River Miles 391, 358 and 133, respectively. Table 1 summarizes the information on the impaired segments in the Missouri River based on the 2002 303(d) listing.

Table 1: Missouri 2002 303(d) List for Impaired Segments in Missouri River

WBID	Waterbody	Size	Unit	Pollutant	Downstream County	Upstream County	Priority
1604	Missouri River	100	Miles	Chlordane, PCBs	St. Louis	Gasconade	High
701	Missouri River	129	Miles	Chlordane, PCBs	Gasconade	Chariton	High
356	Missouri River	125	Miles	Chlordane, PCBs	Chariton	Jackson	High
226	Missouri River	179	Miles	Chlordane, PCBs	Jackson	Atchison	High

<sup>&</sup>lt;sup>3</sup> There is a 19-mile discrepancy between the length of the river (from the Iowa state line to the Mississippi) as recorded in the WQS vs. the mile marker on the river itself at the Iowa line. This amounts to a 3.4 percent difference, which is well within the acceptable standard deviation. However, as ArcView becomes more accurate, the river will be remeasured and in due time this will be reflected in the WQS.

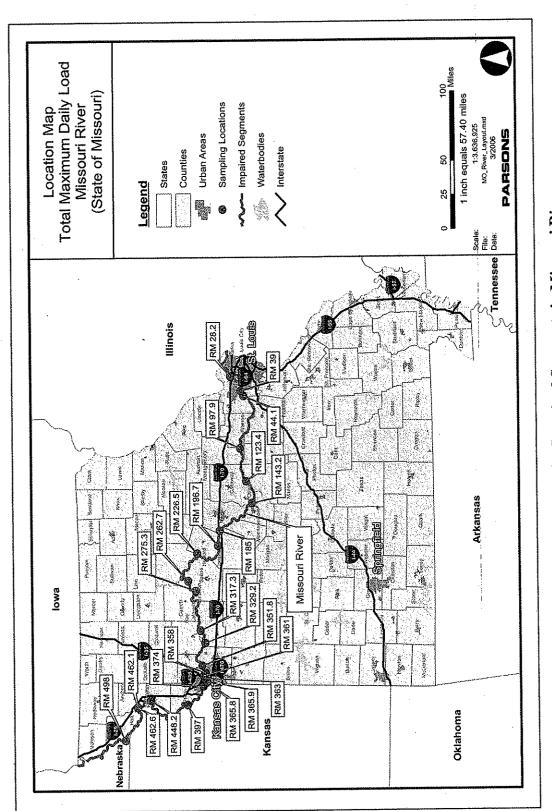


Figure 1: Location Map for Impaired Segments in Missouri River

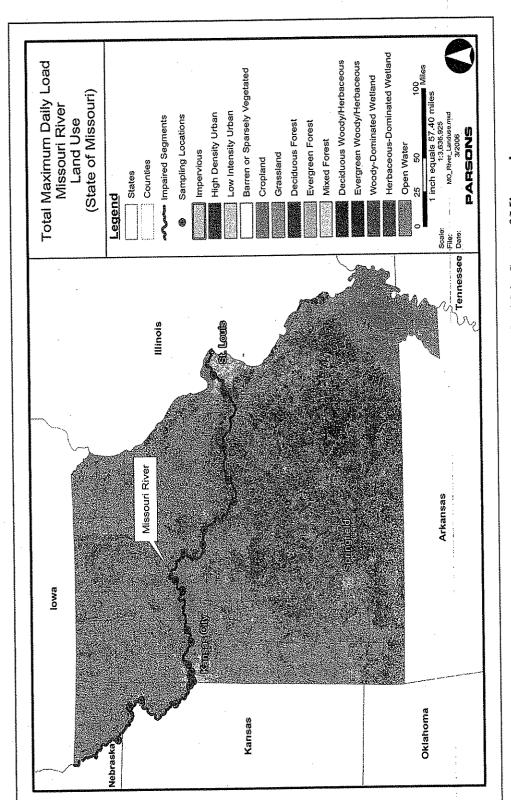


Figure 2: Land Use for Missouri River Watershed within State of Missouri

#### 1.2 Fish Advisories in Missouri:

The Missouri Department of Conservation (MDC) has monitored levels of toxic contaminants in fish from Missouri lakes and rivers since 1984. At that time, MDC discovered elevated levels of chlordane in fish in the Missouri, Mississippi and Meramec rivers. MDC, the U.S. Environmental Protection Agency (EPA) and the department all provide fish tissue sample results to the Missouri Department of Health and Senior Services (DHSS) for use in determining health risks to fish consumers. DHSS, in turn, issues fish consumption advisories. DHSS has issued advisories based on pesticide contaminants in fish since 1985. Past DHSS fish advisories instructed anglers to limit consumption of fatty fish (carp, catfish, buffalo, drum, suckers and paddlefish) to one meal per week. This advisory was rescinded in 2001. Trout also have a high level of fat, but are considered safe to eat from anywhere in the state. In 2002, sturgeon eggs were added to the only existing PCB advisory, which has been in place for sturgeon meat from the Missouri River since 1997.

DHSS issues its fish advisory every year around March or April. The advisory is made available to the public through press releases and may be accessed by calling DHSS at 1-866-628-9891. These advisories are also distributed to all Missouri county health departments and are posted on the Internet. The 2006 advisory may be found at www.dhss.mo.gov/NewsAndPublicNotices/06FishAdvisory.pdf.

## 2. Description of the Applicable Water Quality Standards

#### 2.1 Beneficial or Designated Uses:

These uses are listed on page one. The use that is impaired is protection of warm water aquatic life and human health associated with fish consumption.

#### 2.2 Anti-degradation Policy:

Missouri's WQS include EPA's "three-tiered" approach to anti-degradation and may be found at 10 CSR 20-7.031(2).

Tier 1 – Protects existing uses and provides the absolute floor of water quality for all waters of the United States. Existing instream water uses are those uses that were attained on or after Nov. 29, 1975, the date of EPA's first WQS regulation, or uses for which existing water quality is suitable unless prevented by physical problems such as substrate or flow.

Tier 2 – Protects the level of water quality necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water in waters that are currently of higher quality than required to support these uses. Before water quality in Tier 2 waters can be lowered, there must be an anti-degradation review consisting of: (1) a finding that it is necessary to accommodate important economical or social development in the area where the waters are located; (2) full satisfaction of all intergovernmental coordination and public participation provisions; and (3) assurance that the highest statutory and regulatory requirements for point sources and best management practices for nonpoint sources are achieved. Furthermore, water quality may not be lowered to less than the level necessary to fully protect the "fishable/swimmable" uses and other existing uses.

Tier 3 – Protects the quality of outstanding national resources, such as waters of national and state parks, wildlife refuges and water of exceptional recreational or ecological significance. There may be no new or increased discharges to these waters and no new or increased discharges to tributaries of these waters that would result in lower water quality (with the exception of some limited activities that result in temporary and short-term changes in water quality).

#### 2.3 Specific Criteria:

#### 2.3.1 Chlordane

The specific criteria for chlordane are found in Missouri's Water Quality Standards, 10 CSR 20-7.031, Table A, under Persistent, Bioaccumulative, Man-made Toxics. The limit for chlordane *in water* related to human health protection associated with fish consumption is 0.00048 micrograms per liter (µg/L or parts per billion). However, elevated chlordane levels in water are not the problem. As chlordane tends to bioaccumulate in fish, this TMDL will be based on fish tissue chlordane levels. Fish tissue levels refer to the amount of chlordane in the fillet, or edible portion, of fish. The U.S. Food and Drug Administration (FDA) developed a fish tissue action level of 0.3 milligrams per kilogram (mg/kg or parts per million) for technical grade chlordane. Note: 1 kilogram equals approximately 2.2 pounds. However, the department and DHSS use the action level of 0.1 mg/kg sum-of-the-isomers of chlordane. If the level of a toxic contaminant exceeds this action level or the unrestricted consumption level, a fish consumption limit advisory that provides a risk-based, safe consumption level for target populations is issued regarding the potential health risk associated with long-term consumption of contaminated fish.

#### 2.3.2 PCBs

The specific criteria for PCBs are found in Missouri's WQS, 10 CSR 20-7.031, Table A, under Persistent, Bioaccumulative, Man-made Toxics. The limit for PCBs *in water* related to human health protection associated with fish consumption is 0.000045 µg/L. The FDA set a 2.0 mg/kg limit on PCBs in fish tissue for interstate shipment of fish for human consumption. DHSS currently uses this number to issue fish advisories related to PCBs and the department uses the same number to judge impairment of Missouri water bodies by PCBs. However, DHSS has a revised fish advisory methodology that follows EPA guidance, so the threshold value for PCBs will change. The new threshold value for unrestricted consumption is expected to be 0.04 mg/kg of total PCBs in fish tissue. Following adoption of these new guidelines by DHSS, the next state 303(d) listing methodology document will acknowledge them and may be revised accordingly.

<sup>&</sup>lt;sup>4</sup> Data can be collected as technical chlordane or sum-of-the-isomers of chlordane, in which case the action level is 0.1 mg/kg. Sum-of-the-isomers of chlordane is usually comparable to FDA's action level of 0.3 mg/kg technical grade chlordane when the contamination is recent, because there is a lot of the technical chlordane still present. However, after a few years the comparison no longer works well. The department, MDC, EPA and DHSS quantify chlordane by summing the following four chlordane isomers: cis-chlordane, trans-chlordane, cis-nonachlor and trans-nonachlor.

## 3. Current Water Quality Condition and Desired Endpoint

3.1 Current Water Quality Condition:

Several agencies collected fish tissue samples at numerous monitoring sites along the Missouri River from 1976 to 2004. The goal of the fish tissue monitoring and survey program was to analyze fish tissue samples for chlordane and PCBs in order to define water body segments impacted by contamination. Bottom feeding fish such as carp were sampled because of their feeding or dwelling preferences near the bottom of the water column where chlordane and PCBs remain in the sediments.

Even though they have been banned, both chlordane and PCBs degrade very slowly, making them particularly persistent in the environment. They remain in the soil for long periods of time. Because these pollutants are not soluble they are not readily found in the water column. Instead they adsorb to soil particles in lakebed or streambed sediments. Bottom-feeding fish, such as carp, become exposed to chlordane and PCBs due to their feeding and dwelling preferences near streambeds or lakebeds where contaminated sediments persist. Fish uptake these pollutants in water through their gills and through the consumption of contaminated aquatic organisms. Once the pollutants are absorbed into the bloodstream, they accumulate primarily in fatty tissues. Once in the fatty tissues, the pollutants have the ability to biomagnify, or increase in concentration, as the compound is transferred through the food chain. These fish include fatty fish, such as carp, catfish, buffalo, drum, suckers and paddlefish.

3.2 TMDL Endpoint:

The department uses threshold levels of 0.1 mg/kg of chlordane (sum of isomers) and 2.0 mg/kg of total PCBs in fish tissue to determine support of the designated use. As just stated, because DHSS has a revised fish advisory methodology that follows EPA guidance, the threshold value for PCBs will change. The new threshold value for unrestricted consumption will be 0.04 mg/kg of total PCBs in fish tissue. If the average levels of these compounds exceed these levels in fillets of the fish sampled, the water body is considered to be not supporting the fish consumption use. These will be used for the endpoints for these TMDLs and the achievement of these targets should lead to the removal of fish consumption advisories. Missouri's protocol for removing or down grading an advisory requires at least two years of data below these targets.

## 4. Source Inventory and Assessment

#### 4.1 Chlordane:

Chlordane has been identified as a pollutant of concern because it is a bio-accumulative pesticide that is carcinogenic and can cause both acute and chronic toxic effects. Its polycyclic chlorinated organic structure produces deleterious biological effects similar to those of DDT, PCBs and other related substances (MDE, 2000).

Chlordane is a manufactured chemical that was used as a pesticide in the U.S. from 1948 to 1988 (ATSDR, 1995). Since its introduction in the 1940s, chlordane was used as a broad-spectrum pesticide for agricultural, home and commercial control of insects until it was withdrawn from the

market in 1988. The original source of chlordane was runoff, particularly from urban areas where widespread termite eradication occurred around homes in the 1970s and 1980s. Chlordane was also used at nurseries, on golf courses and in agriculture. Chlordane was banned for agricultural use in 1975 and for all uses in 1988; therefore, no additional loading should occur. Some of its trade names include Oktachlor and Velsicol 1068 (ATSDR, 1995). At the height of production, chlordane was the second most widely used organochlorine insecticide in the U.S., with annual production of about 11 million kg/year. Production in the U.S. in 1974 amounted to 9.5 million kg (IPCS, 1988). Over 70,000 tons of chlordane has been manufactured since 1946 (U.S. EPA, 1998).

As previously mentioned, chlordane degrades very slowly, and thus is extremely persistent in the environment (with the ability to stay in the soil for over 20 years). It bio-accumulates in the tissue of bottom-feeding fish (such as carp) which become exposed to chlordane due to their feeding or dwelling preferences near chlordane-contaminated sediments. Eating fish contaminated by chlordane will not make a person immediately ill. However, over a long period of time, chlordane may damage the nervous system, digestive system and the liver (MDNR, 2001).

The department recognizes that there is still chlordane in products in storage sheds, barns and basements. It is possible that chlordane could still find its way into the environment through leaks, use of the product or improper disposal. However, it is estimated that the amount that might actually reach the river is negligible.<sup>5</sup> The reasons for this are: 1) since it has been banned since 1988, the number of people who still have a product containing chlordane is small, 2) chlordane would be only a small portion of the ingredients in the product, 3) The number of people who would use the product is smaller yet and 4) if applied according to directions, it should not cause a problem. Overall, there is no reason to expect that the levels of chlordane in the environment, and therefore chlordane levels in fish tissue, will do anything but decline in the future.

4.2 Polychlorinated Biphenyls (PCBs):

PCBs are a mixture of up to 200 different chlorinated compounds and are stable under conditions of high pressure and high temperature. PCBs are manmade compounds that have been used commercially since 1929. These chemicals were manufactured as combinations of chlorinated biphenyls that differed according to the percentage of chlorine in the mixture. PCBs had a wide variety of industrial applications due to their chemical stability and flame resistance. However, these characteristics also enabled them to remain highly persistent in the environment. PCBs were commonly used as plasticizers, heat-transfer fluids, solvent extenders, hydraulic fluids, flame retardants, sealers, ink carriers, organic diluents and dielectric fluids. They are found in transformers, capacitors, florescent lighting fixtures, televisions, computers, microscope oil, hydraulic oil, caulking compounds and elastic sealant made from 1966 to 1975. The manufacturing of PCBs stopped in the United States in 1977 due to concerns about the persistence of PCBs in the environment and evidence that they bioaccumulate, which can cause harmful health effects.

U.S. industry purchased approximately 1.25 billion pounds of PCBs by the time production stopped in 1977 (U.S. EPA, 1993). EPA estimates that 60 percent, or 750 million pounds, of PCBs produced are still in use in the U.S. in approximately 150,000 PCB transformers and 2.5 million mineral oil transformers (Graham, 1987). Another 36 percent (450 million pounds) of PCBs were

<sup>&</sup>lt;sup>5</sup> Personnel correspondence with Paul Andre, Missouri Department of Agriculture, Pesticide Program, 7/06.

either placed in landfills or dumps or were available to biota via air, water, soil and sediments. The remaining four percent (55 million pounds) were destroyed by incineration or were degraded in the environment (U.S. EPA, 1993). Monsanto Chemical Company in Sauget, Illinois, produced approximately 99 percent of commercial PCBs for U.S. industry and sold the compounds under the trade name Aroclor (ATSDR, 1995a). A four digit numbering code identifies the Aroclors. The first two digits denote the number of carbon atoms in the biphenyl group and the last two digits represent the approximate percentage of chlorine in the mixture. The most common PCBs manufactured include Aroclor 1242, Aroclor 1248, Aroclor 1254 and Aroclor 1260 (Cairns et. al., 1986).

The behavior of PCBs differs depending on the number of chlorine atoms present. Generally, these compounds are relatively insoluble and have the ability to absorb strongly into organic matter. As the chlorine content increases, the solubility of the compounds decrease and the mixture becomes more viscous. PCBs are highly lipophilic (fat loving) and bio-accumulate in fish tissue, which can result in very high concentrations that are unsafe for human consumption (U.S. EPA, 1980). Currently, the primary source of PCB ingestion is through the consumption of contaminated fish (USDHHS, 1995). Fish uptake of PCBs in water through their gills and through the consumption of contaminated aquatic organisms. As with chlordane, PCBs are absorbed into the bloodstream and accumulate primarily in fatty tissues. In these fatty tissues, they have the ability to biomagnify or increase in concentration, as the compound is transferred through the food chain. In humans and other mammals, PCBs accumulate in the gastrointestinal tract, adipose (fatty) tissue and skin.

As already stated, U.S. production of PCBs ended in 1977 because of the evidence that they accumulate in the environment, which can cause harmful health effects. Although production of PCBs was banned, note that the ban was on the manufacture, processing, and distribution in commerce of PCBs. The ban did not extend to existing products containing PCBs, such as transformers. Poorly maintained hazardous waste sites that contain PCBs, industrial and municipal incinerators burning organic waste, illegal or improper dumping of PCB wastes (such as transformer fluids and some capacitors) and leaks from electrical transformers continue to release PCBs into the environment. However, since PCBs are no longer produced, a downward trend in the environment is inevitable.

## 5. Determination of TMDL and Allocation<sup>6</sup>

The following equation was used to calculate the TMDL.

TMDL = WLA + LA + MOS

(Eq. 1)

where:

TMDL: Total Maximum Daily Load

WLA: Waste Load Allocation (for point sources)

LA: Load Allocation (for non-point sources)

MOS: Margin of Safety (to account for uncertainties)

<sup>&</sup>lt;sup>6</sup> Calculations and graphs by Parsons Corporation, a Pasadena-based engineering and construction firm

5.1 TMDL/Loading Capacity:

TMDL or loading capacity is defined as the maximum pollutant load that a water body can assimilate and still attain WQS. EPA banned the use of chlordane in 1988. While the department recognizes that there is still chlordane in existence that is unaccounted for, with the potential to enter the river system, the amount that might actually reach the river is believed to be negligible (see section 4.1). Again, there is no reason to expect that the levels of chlordane in the environment and in fish tissue will do anything but decline in the future. Therefore, the TMDL for chlordane in the 533 mile impaired segment along the Missouri River is set as zero pounds/day.

Similarly, EPA banned the use of PCBs in 1977. Again, the department acknowledges that there is the potential for a certain amount of PCBs to leak into the environment (see Source Inventory-PCBs above). However, judging from the available data, that amount is deemed to be small and declining. Therefore, the TMDL for PCBs in the 533 mile impaired segment along the Missouri River is set as zero pounds/day.

#### 5.2 Waste Load Allocation:

As stated earlier, these two compounds are mainly a sediment issue and amounts in the water column are virtually non-detectable. There are no Missouri facilities which discharge either directly to the Missouri River or to a tributary where the Missouri River is the first classified water body, that have that potential for discharging detectable amounts of PCBs or chlordane. Since chlordane and PCBs were banned in 1988 and 1977, respectively, there should be negligible discharge of chlordane and PCBs into streams from wastewater treatment plants and other point sources. Therefore, the WLA is set as zero pounds/day in this TMDL.

#### 5.3 Load Allocation:

Since chlordane and PCBs were banned, there will be only minor and/or infrequent application of chlordane anywhere that might be discharged under runoff conditions and enter the river. As time passes, this, too, will decline. Therefore, the LA is set as zero pounds/day in this TMDL.

5.4 Margin of Safety:

In order to ensure there is no threat of chlordane and PCB levels impairing fish consumption, fish advisories will remain in effect until all samples taken from fish have met the desired endpoint for two years. The department will coordinate with DHSS in guarding against threats to human health associated with fish consumption from these two contaminants.

#### 5.5 Seasonal Variation:

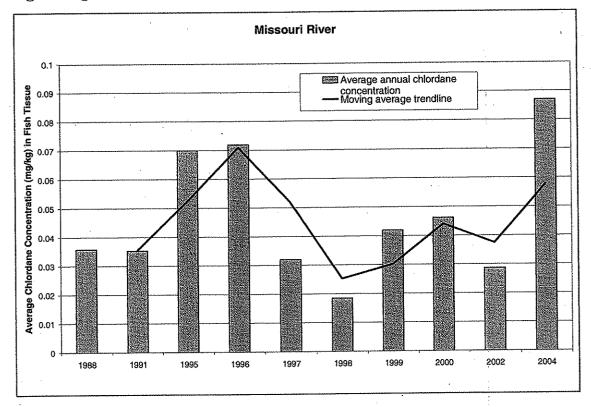
There is no seasonal variation associated with this TMDL.

## 6. Implementation

Since chlordane and PCBs have been banned, there is no specific remediation plan for this impairment. In regard to existing stores, stashes and unused inventory of these products, Missouri continues to collect them as they are turned in for proper disposal through various hazardous waste and hazardous household waste disposal initiatives. A major source of PCBs is transformers. Transformer fluid is tested and properly disposed of as the transformer ends its useful life.

Otherwise, fish tissue concentrations are declining as chlordane and PCBs are purged or degraded in water body sediments over time. Figures 3 and 4 show the average annual chlordane and PCB concentrations and their corresponding moving average trends.

Figure 3: Average Annual Chlordane Concentration (as Sum-of-the-Isomers) and Three-Year Moving Average in Missouri River over Time



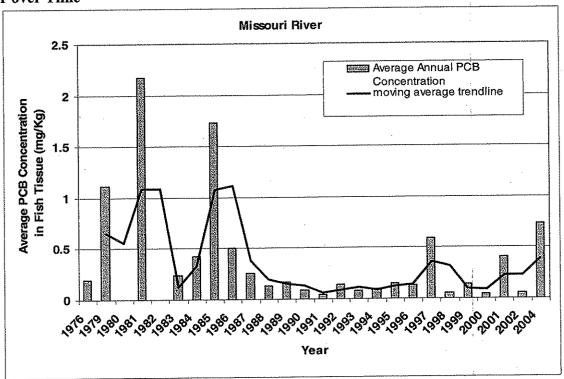


Figure 4: Average Annual PCB Concentration and Three-Year Moving Average in Missouri River over Time

The department recognizes that data collected to date do not always reflect a downward trend of PCBs or chlordane on a year-to-year basis; however, that this is most likely due to collection inconsistencies. Some years of data contain tissue samples of many different fish species, but some years contain only one or two species of fish. Fatty fish, such as carp, tend to absorb more PCBs than a less fatty fish such as catfish. Likewise, feeding habits, rainfall and age and size of the fish can effect the amount of sediment (thus PCBs and chlordane) assimilated by fish or the bio-accumulative effect. The most recent data predominately sampled catfish and sturgeon, however in 2004, only sturgeon was sampled. This would tend to show increasing levels of PCBs and chlordane in later years and obscure the overall downward trend. When only fillets are considered, from the year 2000 to the present, concentrations of both compounds are consistently below the stated action levels.

As mentioned, these pollutants degrade slowly and are extremely persistent in the environment. However, since they are no longer produced, a downward trend is inevitable and this TMDL recommends development of a consistent protocol for measurement of the pollutants in fish tissue and continued sampling.

This is a phased TMDL, which means that if future data indicates fish tissue chlordane and PCB levels are not continuing to decline, this TMDL will be re-evaluated. This TMDL will be incorporated into Missouri's Water Quality Management Plan.

#### 7. Public Participation

This TMDL was on public notice from June 9 to July 9, 2006. Due to comments received during the first notice period, which resulted in substantial changes to the TMDL document, a second public notice period was needed. This period was from Aug. 30 to Sept. 29, 2006. Groups who received the public notice announcement included the Missouri Clean Water Commission, the Water Quality Coordinating Committee, the water quality departments in neighboring states where the Missouri River is a shared border (Kansas and Nebraska), the 155 Stream Team volunteers in the watershed, and the 51 legislators representing all the counties bordering this river. Also, the department posted the notice, the Missouri River Information Sheet and this document on its Web site, making them available to anyone with access to the Web. The department has placed a copy of the notice, the comments received and its responses in the Missouri River file.

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## Appendix

Table A: Sampling Locations along Missouri River

Table B: Missouri River Fish Tissue Data

Table A: Sampling Locations along Missouri River

Number	Location	Station Name	River	Latitude	Longitude	Data Source
LIGHTOCK		J	Mile		9	
1	Missouri River	Rulo, Nebraska	RM 498	40.0394	-95.4144	NDEQ
2	Missouri River	below Nodaway River, Missouri	RM 462.6	39.9003	-94.96022	MDC
3	Missouri River	Nodaway Island Access, Missouri	RM 462.1	39.9013	-94.9531	MDC
4	Missouri River	St. Joseph, Missouri	RM 448.2	39.754	-94.858	EPA/MDNR USEPA MDC
5	Missouri River	Leavenworth, Kansas	RM 397	39.3291	-94.9085	USEPA MDC USGS
6	Missouri River	Kansas City, Missouri	RM 365.8	39.1194	-94.534	EPA/MDNR USEPA MDC USGS
7	Missouri River	below I-635, Missouri	RM 374	39.1531	-94.6495	USEPA MDC
8	Missouri River	below US 169, Missouri	RM 365.9	39.113	-94.586	USEPA
9	Missouri River	above Hwy 269, Missouri	RM 363	39.1387	-94.5424	USEPA
10	Missouri River	above I-435, Missouri	RM 361	39.1515	-94.5117	USEPA
11	Missouri River	below Blue Ridge Blvd., Missouri	RM 358	39.1291	-94.4686	USEPA EPA/MDNR MDC
12	Missouri River	near Shoal Creek, Missouri	RM 351.8	39.168	-94.3723	USEPA MDC
13	Missouri River	Napolean, Missouri	RM 329.2	39.1342	-94.0645	MDC
14	Missouri River	Lexington, Missouri	RM 317.3	39.1869	-93.8965	EPA/MDNR USEPA MDC
15	Missouri River	near Malta Bend, Missouri	RM 275.3	39.2382	-93.3614	MDC .
16	Missouri River	Miami, Missouri	RM 262.7	39.3289	-93.2252	MDC
17	Missouri River	Glasgow, Missouri	RM 226.5	39.2223	-92.8505	MDC
19	Missouri River	Boonville, Missouri	RM 196.7	38.9812	-92.7456	MDC

Table A: Sampling Locations along Missouri River

Number	Location	Station Name	River Mile	Latitude	Longitude	Data Source
19	Missouri	near Columbia,	RM 185	38.9597	-92.545	EPA/MDNR
20	Missouri River	Jefferson City, Missouri	RM 143.2	38.5875	-92.1788	USEPA MDC
21	Missouri River	Mokane, Missouri	RM 123.4	38.6519	-91.8831	MDC
22	Missouri River	Hermann, Missouri	RM 97.9	38.71	-91.4391022	EPA/MDNR MDC USGS
23	Missouri River	Weldon Springs CA, Missouri	RM 44.1	38.6565	-90.7332	MDC
24	Missouri River	Chesterfield, Missouri	RM 39	38.6874	-90.6627	USPHS MDC
25	Missouri River	St. Charles, Missouri	RM 28.2	38.7984	-90.4662	MDC

# Table B: Missouri River Fish Tissue Data for Sum of the Isomers (SOI) of Chlordane and PCBs from 1976 to 2004

Note: For use in calculations, the original data were adjusted as follows: Where the data were recorded as "less than" values, half that value is used. Where data were recorded as "Trace amount", zero (0) is used. The SOI Chlor and PCB columns below reflect these adjustments. The units for both are milligrams per kilogram (mg/kg).

Org	Site	WBID	Site Name	Date	Species	County	Type	# in sample	SOI Chlor	PCB
MDC	701/92.2	701	Missouri R. @ Boonville	1976	CAT	COOPER	AND HEAD WATER	6		0.81
La personante de la	والمارية والمارية المارية المارية المارية والمارية والمارية والمارية والمارية والمارية والمارية والمارية والمارية	The state of the same and the	Comprehensive and the production of the comprehensive and the comp	com an experiency rainest.	MIXED	COLE	************	estallighter designation of the tensor and the second	HAND SHEET S	0.462
	701/39.5	-	Missouri R. @ Jefferson City		Carrier and Control and State of the State o			4	And the second s	0.161
USEPA	701/39.5	701	Missouri R. @ Jefferson City		RED	COLE	The state of the s	estationes employees and a	general state of the state of t	0.101
USEPA	701/39.5	701	Missouri R. @ Jefferson City	1976	FH CAT	COLE		1	dentition dynamical variations are research to the	0
USEPA	701/39.5	701	Missouri R. @ Jefferson City	1976	G EYE	COLE		1	Militer Additional Photo The "All Profession After	0.448
USEPA	226/80.5	226	Missouri R. @ St. Joseph, Mo.	1976	CARP	BUCHANAN	المداد والعاوس والعالم والعوامر	1	Andrew States in a production of the States	0.12
Compression and a personal repression of	226/80.5	226	Missouri R. @ St. Joseph, Mo.	1976	G EYE	BUCHANAN	to the freezent over the proper	4		0.281
USEPA	226/80.5		Missouri R. @ St. Joseph, Mo.	1976	S GAR	BUCHANAN	April Control Control Control	1	A COMMITTER OF THE PROPERTY OF	0.086
And an income the work of the contract of the	226/80.5	226	Missouri R. @ St. Joseph, Mo.	1976	CARPSU	BUCHANAN	} } }	3		0.166
	u	356	MO R. KC	1976	CARP	September and a second contract of the second		1		0.344
USEPA	u	356	MO R. KC	1976	G SHAD	LANGE COLOR OF METERS AND STATE OF THE STATE	from all prostructions can as	3	rigina andriamentonicasi maandistasin	0.751
CARROLANDON HANDERS WHITE A STANDAR	u	356	MO R. KC	1976	BUF			2	Security sector in the present action states	0.121
USEPA	u	356	MO R. KC	1976	B CRA	pagganis y segre as a la company of the company of	angles kalantes milina	1	Carried Committee (Art - State ) to Art - State )	0
USGS	1604/97.9	1604	Missouri R. @ Hermann	1979	SM BUF	GASCONADE	W	1	Marie N. Lands and Lance Co. St. Lance Co. Sec. Lett.	0.9
USGS	1604/97.9	1604	Missouri R. @ Hermann	1979	CARPSU	GASCONADE	W	11		2.2
USGS	1604/97.9	1604	Missouri R. @ Hermann	A	CARPSU	GASCONADE	W	11	rayno apour con med months to be the	1.7
<b>EPA/MDNR</b>	1604/97.9	1604	Missouri R. @ Hermann	1980	B BUF	GASCONADE	W	5		0
EPA/MDNR	The transfer years to be and an elementary	Water Street, by Now House or with	Missouri R.@ St. Joseph, Mo.	1980	CARP	BUCHANAN	W	5	and the restation desired in the state of	
EPA/MDNR	1604/97.9	1604	Missouri R. @ Hermann	1981	CARP	GASCONADE	W	5		0

comment assessment management and state of contract of the con	opromise del abolement de papa alle autre acte autre e 11 année des cons		pag varurament ob x = 1 t post or every open below, before him was a supercrease poly observation from the constitution to		0400	DIATT	W	E	. 0
USEPA	226/30.1		Missouri R. @ Leavenworth, KS		Company of the State of the State of the Company of the State of the S	PLATTE	and the second second second second second second		0
USEPA	356/77.4		Missouri R. @ Lexington	AND A RESIDENCE OF PERSONS AS A	agent a femoral for algebra a store as a contractor of	LAFAYETTE		5	
USEPA	356/77.4		Missouri R. @ Lexington	general entre designation	Committee and the second second	LAFAYETTE	W	3	0
EPA/MDNR	226/80.5	226	Missouri R. @ St. Joseph, Mo.		CARP	BUCHANAN	W	5 	0
<b>EPA/MDNR</b>		356	MO R. KC		CARP	ngan dingga kanggangangan angan kanada an arawa nakara in haji dalah sebinga	W	5	0
USEPA	u	356	MO R. KC	1981	CARP	grunt, agglegagere annet ka transmit sterrike, kare i ka i rapinsk felk k	W	5	0
USEPA	u		MO R. KC	1981	CARP		W	6	22.3
EPA/MDNR	a Security of their land and a second relation to be all the second and the secon		Missouri R. @ Hermann	1982	B BUF	GASCONADE	W	5	0
			Missouri R. @ St. Joseph, Mo.		CARP	BUCHANAN	W	5	0
EPA/MDNR			Missouri R. @ Hermann	feet a partie of the control	CARP	GASCONADE	W	3	0.24
EPA/MDNR	<ul> <li>Delanda benevit altrica sactor; pera palaming a consumption</li> </ul>	1004	WISSOUTH, @ Hermann	1983	( first president bettering by the discontinue profes	PLATTE	w	the Processive State and State and Assessment A	0
USEPA	226/30.1		Missouri R. @ Leavenworth, KS	1983	manufact, of press \$1/4/courts, chief of her of alfances;	BUCHANAN	W		0
USEPA	226/80.5		Missouri R. @ St. Joseph, Mo.	igneration and inspectors on		BUCHANAN	W	5	0
EPA/MDNR	226/80.5		Missouri R. @ St. Joseph, Mo.		CARP	DUCHANAN	W	6	0
EPA/MDNR	u		MO R. KC	description of the second of the	CARP		and the contract of the state o	raco, and a south against an above a series	0.054
EPA/MDNR	1604/97.9	1604	Missouri R. @ Hermann	Comment would be a second with the	CARP	GASCONADE	W		high things in facility to the Control of the Contr
EPA/MDNR	356/77.4	356	Missouri R. @ Lexington	1984	CARP	LAFAYETTE	W	<u>5</u>	
EPA/MDNR		701	Missouri R. nr. Columbia		CH CAT	BOONE	F	20	0.077
EPA/MDNR	the state of the state of the same of the		Missouri R. nr. Columbia	1984	CARPSU	BOONE	F	20	0.254
EPA/MDNR	the same and the second second second second second	the built or bringer a beauty and a	Missouri R. nr. Columbia	1984	FH CAT	BOONE	F	20	0.095
EPA/MDNR			Missouri R. nr. Columbia		SHSTUR	BOONE	F	20	2.52
			Missouri R. nr. Columbia	er and the contract of the contract of the	CARP	BOONE	F	14	0.058
EPA/MDNR	Contract to the second continues of the		Missouri R. @ St. Joseph, Mo.		CARP	BUCHANAN	W	7	0
EPA/MDNP	Market Market States Sanger Special Section 5.	makind peoplemen	the fact that the profession is an executable to the extended the fact that the profession is a fact that the fact	· Sucre mesone rimeir d	CARP	ale angresia sa langa ngantanganika karamin dinastra	W	5	2.11
EPA/MDNP			MO R. KC	CONTRACTOR OF SUCCESSION	CARP	GASCONADE	W	3	0.159
EPA/MDNF			Missouri R. @ Hermann			GASCONADE	W		0.285
EPA/MDNF			Missouri R. @ Hermann	and the same of th	CARP	TO SECURE AND ADDRESS OF THE OWN THE SECOND SECONDS OF SECOND P. C.	W		0.53
EPA/MDNF	356/77.4		Missouri R. @ Lexington		CARP	LAFAYETTE		5 5	A Particular - Southern Control of the Control of t
<b>EPA/MDNF</b>	356/77.4		Missouri R. @ Lexington		CARP	LAFAYETTE	W		the contract of the second
EPA/MDNF	lu	356	MO R. KC		CARP		W	4	5.11
EPA/MDNF	with the property of a series of the same and a series of the	356	MO R. KC	1985	CARP	The same of the sa	\ \W	3 .	7.49
EPA/MDNF		1604	Missouri R. @ Hermann	1986	CARP	GASCONADE	W	6	0.075
MDC	701/80.7		Missouri R. nr. Columbia	1986	CH CAT	BOONE	F	paraul california apparamento con la biometra fi	0.075
MDC	701/80.7		Missouri R. nr. Columbia	1986	BUF	BOONE			0.075
MDC	701/80.7		Missouri R. nr. Columbia	والمعارض والمراجع والمراجع والمراجع أراجي	SHSTUR	BOONE	E		1.807
	A To Service Principle belonging of the Annual Principle of the Annual Princip		Missouri R. nr. Columbia		CARP	BOONE	F	and interesting to produce and many series	0.075
MDC	701/80.7		Missouri R. nr. Columbia		SHSTUR		F	entelberge versical (strongenous un 25 le),	0.551
MDC	701/80.7				SHSTUR		) E	and age, to remain expression to the field	1.039
MDC	701/80.7		Missouri R. nr. Columbia		SHSTUR		1 E	-/- t <sub>ar</sub> a <sub>r</sub> - 2.0, 200721 WOODS W. 7.17 P.V	1.512
MDC	701/80.7		Missouri R. nr. Columbia				E	en amendad en granianamen dans 'n P	1.131
MDC	701/80.7	CHARLEST CONTROL	Missouri R. nr. Columbia		SHSTUR		E	Land of the second section of the	2.363
MDC	701/80.7	701	Missouri R. nr. Columbia	1980	SHSTUR	BOUNE	F	phone man in program of the description of the desc	0.075
MDC	701/80.7	701	Missouri R. nr. Columbia		W BASS		and promote representation and	About the transferred in Philipser Comments pro-	
MDC	701/80.7		Missouri R. nr. Columbia		SHSTUR		F		1.265
MDC	701/80.7	701	Missouri R. nr. Columbia		SHSTUR		l E		0.493
MDC	701/80.7	70	Missouri R. nr. Columbia	198	6 CARPSU		J.F.		0.356
MDC	701/80.7		Missouri R. nr. Columbia		6 DRUM	BOONE	F	Lapono en monero a semenon en reconstrui	0.123
MDC	701/80.7		Missouri R. nr. Columbia	198	6 SHSTUR	BOONE	F	Superior de Samuelos d'Ambieros persons de la	0.578
MDC	701/80.7		Missouri R. nr. Columbia		6 SHSTUR		F	1	0.316
	CANAGE AND LONG THE OWN DATE OF THE PROPERTY OF THE PARTY OF		Missouri R. @ St. Joseph, Mo.		6 CARP	BUCHANAN	W	5	0.13
EPA/MDNI		220	Missouri R. @ St. Joseph, Mo.		6 CARP	BUCHANAN	W	5	0.13
EPA/MDNI	THE PARTY OF TAXABLE PARTY.				6 CARP		W	5	1.22
EPA/MDNI			MO R. KC		6 CARP	ng punggan nganan ana garan ng nganan ng Tanggan nganan ng ng	W	5	2.16
EPA/MDNI	<b>Վ լ Ա</b>	Contracts of the State of Stat	MO R. KC	array and a respective processing the state of the	But the first of the second se	ting and the second from the continue of the c	F	5	
MDC	u.	Commission of the second second	6 MO R. KC	we do receive our not not	6 CARP	and any one of the provider of the state of	F		ary na ang gaparagaan na na ang promong pagaman na pang pang pang manahang panggan banda
MDC	u		6 MOR. KC	にゅうしゅつしゅい しゅうしん	6 CH CAT	an also come come come and an analysis of the second		5	0.27
MDC	701/92.2		1 Missouri R. @ Boonville		7 FH CAT	COOPER	Į Ę	1	0.0
MDC	701/92.2	70	1 Missouri R. @ Boonville		7 FH CAT	COOPER	E	5	CONTRACT CONTRACTOR OF THE ACT OF ACCOUNT OF THE PROPERTY CONTRACTOR OF THE PROPERTY OF THE PR
MDC	701/92.2	70	1 Missouri R. @ Boonville		7 CH CAT	COOPER	F	5	0.20
R	701/92.2		1 Missouri R. @ Boonville	198	7 CH CAT	COOPER	F	5	0.09
MDC	701/92.2		1 Missouri R. @ Boonville		7 CH CAT	COOPER	F	5	0.07
	, , , , , , , , , , , , , , , , , , ,		1 Missouri R. @ Boonville		7 CH CAT	COOPER	F	1	0.24

particular production between		TOUR PROPERTY OF THE PROPERTY	1007/0400	COOPER	F	5	0.07
March Springered Streetly, by Springer Street, Springer, School, of Street,	701/92.2	701 Missouri R. @ Boonville	1987 CARP	COOPER	F	5	0.093
and the property of the proper	701/92.2	701 Missouri R. @ Boonville	1987 CARP 1987 CARP	COOPER	F	1	0.09
propagation of the second seco	701/92.2	701 Missouri R. @ Boonville	Figure workstook and kinedia and deviction in the section is the standard and property of the security in	and the state of t	F	والموقود والمراب شعوده بالمتحادة والمتحادث والمتحادث	0.068
THE COMMISSION OF THE PARTY OF	701/92.2	701 Missouri R. @ Boonville	1987 CARPSU	والمراهدي وتردها والمالية ومراهل والمالية والمالية والمالية والمالية والمالية والمالية والمالية والمالية	per et de la participa de la companya de la company	5	0.303
many and an interest and a state of the stat	701/92.2	701 Missouri R. @ Boonville	1987 SHSTUR	to figure a superior and the second and the second second and the second	F	6	0.019
Color Cardinated by Land by State Constitution of Control of the State Co.	701/92.2	701 Missouri R. @ Boonville	1987 DRUM	COOPER	F	5	0.025
and the second section of the second section is a second section in the second section in the second section is a section in the second section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section in the section is a section in the section in	1604/43.9	1604 Missouri R. @ Chesterfield	1987 BM BUF	ST LOUIS	F	5	0.025
MDC	1604/43.9	1604 Missouri R. @ Chesterfield	1987 FH CAT	ST LOUIS	transport of the second of the	3	0.025
MDC	1604/43.9	1604 Missouri R. @ Chesterfield	1987 CARP	ST LOUIS	F. F.	5	harmon with hitten was extend to a partition research and sector and
MDC	1604/43.9	1604 Missouri R. @ Chesterfield	1987 BL CAT	ST LOUIS	F	3	0.121
Lawrence and property and the second	1604/43.9	1604 Missouri R. @ Chesterfield	1987 CH CAT	ST LOUIS	F	3	0.081
MDC	1604/43.9	1604 Missouri R. @ Chesterfield	1987 CARP	ST LOUIS	F.		0.023
EPA/MDNR	to have the broken the found of the samp party and produce the same of the	1604 Missouri R. @ Hermann	1987 CARP	GASCONADE	<u>w</u>	2	**************************************
CHARLES AND A PROPERTY OF THE PROPERTY AND A STATE OF THE PARTY AND AND	226/30.1	226 Missouri R. @ Leavenworth, KS	1987 FH CAT	PLATTE	<u> </u>	5	0.025
MDC	226/30.1	226 Missouri R. @ Leavenworth, KS	1987 CARP	PLATTE	F		0.025
MDC	226/30.1	226 Missouri R. @ Leavenworth, KS	1987 CARP	PLATTE		4	0.036
MDC	226/30.1	226 Missouri R. @ Leavenworth, KS	1987 CH CAT	PLATTE	F	3	0.121
MDC	226/30.1	226 Missouri R. @ Leavenworth, KS	1987 FH CAT	PLATTE	F	4	0.121
MDC	226/30.1	226 Missouri R. @ Leavenworth, KS	1987 CARP	PLATTE	F	5	0.025
MDC	226/30.1	226 Missouri R. @ Leavenworth, KS	1987 CARP	PLATTE	F	5	0.025
MDC	226/30.1	226 Missouri R. @ Leavenworth, KS	1987 CARP	PLATTE	E	5	0.025
MDC	226/30.1	226 Missouri R. @ Leavenworth, KS	1987 CH CAT	PLATTE	F	5	0.025
MDC	226/30.1	226 Missouri R. @ Leavenworth, KS	1987 FH CAT	PLATTE	F	5	0.053
MDC	356/77.4	356 Missouri R. @ Lexington	1987 CH CAT	LAFAYETTE	F	5	0.025
MDC	356/77.4	356 Missouri R. @ Lexington	1987 SM BUF	LAFAYETTE	F		0.025
MDC	356/77.4	356 Missouri R. @ Lexington	1987 FH CAT	LAFAYETTE	F	5	0.055
MDC	356/77.4	356 Missouri R. @ Lexington	1987 CARP	LAFAYETTE	F	5 5 3	0.139
USEPA	356/124.2	356 Missouri R. ab. Hwy. 269	1987 CARP	JACKSON	W		0.54
USEPA	356/124.2	356 Missouri R. ab. Hwy. 269	1987 CARP	JACKSON	W	3	0.64
USEPA	356/122.2	356 Missouri R. ab. I-435	1987 CARP	JACKSON	W	3	0.702
USEPA	356/122.2	356 Missouri R. ab. I-435	1987 CARP	JACKSON	W	3	0.425
USEPA	356/119.2	356 Missouri R. bl. Blue R.	1987 CARP	CLAY	W	3	3.22
USEPA	356/119.2	356 Missouri R. bl. Blue R.	1987 CARP	CLAY	W	3	1.26
USEPA	226/6.7	226 Missouri R. bl. I-635	1987 CARP	PLATTE	W	3	0.63
USEPA	226/6.7	226 Missouri R. bl. I-635	1987 CARP	PLATTE	W	3	0.63
USEPA	356/127.2	356 Missouri R. bl. US 169	1987 CARP	JACKSON	W	4	0.673
USEPA	356/127.2	356 Missouri R. bl. US 169	1987 CARP	JACKSON	W	5	0.395
USEPA	356/112.7	356 Missouri R. nr. Shoal Cr.	1987 CARP	CLAY	W	3	0.225
USEPA	356/112.7	356 Missouri R. nr. Shoal Cr.	1987 CARP	CLAY	W	3	0.215
EPA/MDNR		226 Missouri R. @ St. Joseph, Mo.	1987 CARP	BUCHANAN	W	4	0.18
EPA/MDNR		226 Missouri R. @ St. Joseph, Mo.	1987 CARP	BUCHANAN	W	4	0.279
EPA/MDNR		356 MO R. KC	1987 CARP	Andrew Andrews and Property and Control of the Cont	W	3	3
MDC	u	356 MO R. KC	1987 DRUM	Provide an expensive an expensive and expensives of expensive and a find and a sequent	F	5	0.025
MDC	u	356 MO R. KC	1987 FH CAT	Clife Service months of process and the Service Services of the Service Services and Service Services Services	F	3	0.025
EPA/MDNR	all produces according to the last a separation of the separation	356 MO R. KC	1987 CARP	n yan iyo aaqabaada a gig aadaabaa iiqaabaaq aan ii ii aa aa aa aa ah ii	W	3	1.335
MDC	u	356 MO R. KC	1987 CH CAT	property of the first of the state of the st	F	4	0.025
MDC	lu l	356 MO R. KC	1987 CH CAT	men die kelemakan kan kan basi basi basi mendindan dinggan din	F	4	0.092
MDC	u	356 MO R. KC	1987 SHSTUR	The second section of the section of the second sec	F	1	0.17
MDC	u	356 MO R. KC	1987 BM BUF	and the second s	F	5	0.025
MDC	u	356 MO R. KC	1987 SM BUF	Building of a facility or common to the Chillippers operation and a specialists of the states about a facility	F	5	0.025
MDC		356 MO R. KC	1987 CARPSU	Control of the second second second section and second section of the se	F	5	0.092
MDC	i <u>u</u>	356 MO R. KC	1987 CARP	the same of the state of the same fine \$10 and same a law enters by the same function.	F	5	0.053
	U.	356 MO R. KC	1987 CARP	constitution of the months of the section of the se	F	5	0.095
MDC	<u>u</u>	356 MO R. KC	1987 CARP	agrifus receives a securina and a process and a second	F	5	0.079
MDC	<u>u</u>	manufacturing the Manufacturing Contract or contract and contract and contract the contract of	1987 CH CAT	ang ang kanang manang	F	3	0.025
MDC	U.	356 MO R. KC	1987 FH CAT	plane of the state to proper investment the engineering to provide a section of action	F	4	0.025
MDC	1004/07.0	356 MO R. KC	1988 CH CAT	GASCONADE	w	4	0.31
	1604/97.9	1604 Missouri R. @ Hermann	1988 CARP	PLATTE	W	5	0.03

To the second and property and the property of the second and	referenting spaces and a process on particular particul				7.000	~ F*\/F	DI ATTE	387	E 1		0.72
Christman about the billion bill and the programmer	226/30.1			Leavenworth, KS	Service management to be being.	AND REAL PROPERTY AND THE PERSON NAMED IN	PLATTE	W	5	Caracana and a series of the s	Cramatic and the second
USGS	226/30.1			Leavenworth, KS		particular and a second second	PLATTE	<u> </u>	5	ya mara ilika da sanaya a baban da	0.03
USGS	226/30.1			Leavenworth, KS	happy to a try or a produce and of	SHSTUR	The hard way a service of the property of the bless of the ball	W	5	and the University of the Park Control of the	0.7
USGS	226/30.1	226	vissouri R. @	Leavenworth, KS	1988	CH CAT	PLATTE	W	3	was well as well as the second below the second by	0.3
NDEQ	226/NE	A	viissouri R. @	Rulo, NE	1988	CARP		F	5	0.049	0
NDEQ	226/NE	A	viissouri R. @	Rulo, NE	1988	CH CAT	1	F	3	0.052	0.081
NDEQ	226/NE		vissouri R. @		1988	CH CAT		F	3	0.013	0.43
NDEQ	226/NE		Vissouri R. @			CH CAT	South the second	-	3	0.03	0
EPA/MDNR	Service Appropriately appropriate to the book and the propriate and		Vissouri R. bl.		dan bir garaktaran pertakan k	CARP	CLAY	W	4	J., ALC: 12200100499940000	0.088
EPA/MDNR	Challe the " prince and represent the by the right of character of plant			St. Joseph, Mo.	Conservation of the second	CARP	BUCHANAN	W	5	and the second s	0.155
Tarak Alban Arranga Salah Sala	the state of the s			ot. doseph, mo.	Car y by annual verb walle I dear go	CARP	The state of the s	W	5	And the state of t	0.55
USGS	u	a valence and an address of the state of	VO R. KC	as analysis on a mass of the state of the second section of the second section of	-fe-commonweal	TABLE OF SUP THE SPECT OF THE STATE		W	5		0.62
USGS	<u>u</u>		MO R. KC		h (red on more shoromeressa)	DRUM		W	5		0.33
USGS	u		VO R. KC	entagrif ar a la californi espera e estruccione, para careller a comun el bando i corte estreta a cal	Cartill Contra a militare to the	CHICAT	000000	F	PARTICIPATE OF THE PROPERTY OF THE STATE OF	CANAL SAME CONTRACTOR SAME SAME	0.165
MDC	701/92.2		Missouri R. @			CARP	COOPER		5		
MDC	701/92.2		Vissouri R. @		\$40,7 *L***** 130 *** ** A ******	CH CAT	COOPER	E	5	gapana, jelan a majarit ya dipi danip a liangi di mbalingi (	0.111
MDC	701/92.2	701	Viissouri R. @	Boonville		FH CAT	COOPER	F	3		0.025
MDC	1604/97.9	1604	Vissouri R. @	Hermann	1989	CH CAT	GASCONADE	F	5		0.133
EPA/MDNR		1604	Missouri R. @	Hermann	1989	CARP	GASCONADE	W	1		0.231
MDC	1604/97.9	and the state of t	Vissouri R. @	menten gegen betracht aber ber ber gemeine menter mente bestell der be gefalle erre.	1989	CARP	GASCONADE	L.F.	3		0.127
MDC	1604/97.9	Prichal Menajulah Angelow degles	Missouri R. @		COLUMN HARMAN	CARP	GASCONADE	F	2		0.131
MDC	701/39.5		Missouri R. @		all programme and the second	CH CAT	COLE	F	5	Spen Chine and Chinese when the state was to be	0.072
	-Controllement of money property in the Authority					CARP	COLE	F	5	and the section of the section of the section of	0.093
MDC	701/39.5		Missouri R. @		a first a consideration and a construction of	CH CAT	PLATTE	F	5	al a principal de la companya de la	0.173
MDC	226/30.1	CANADA WALE PRODUCTION AND AND DESCRIPTION OF THE PARTY O	my principality and an employee in manager and the principality and the second	Leavenworth, KS	THE OWNER OF THE PERSON ASSESSMENT	the second comments of the second of the second	PLATTE	F	Mp #1 144 C. Seller & Mariner y 15 marine, p 4.6 4		0.025
MDC	226/30.1			Leavenworth, KS	Actual way of market and an actual	CARP		and the same of th	<u> </u>		0.151
MDC ·	1604/28.0		Missouri R. @		and a second second second	CARP	ST CHARLES	<u>E</u>	5	el de proprietaziones en este per desperate	
MDC	1604/28.0		Missouri R. @		and the second second	CH CAT	ST CHARLES	L.E.	3	is Marandianerra gas associativa	0.161
EPA/MDNR	356/119.2	356	Missouri R. bl.	Blue R.		CARP	CLAY	L	5		1.82
MDC	701/80.7	701	Missouri R. nr.	Columbia	nači spretov garrenalizirarini,	CH CAT	BOONE	F	5	and the second and deficient of malestand entreme and	0.025
MDC	701/80.7	701 l	Missouri R. nr.	Columbia	1989	SHSTUR	BOONE	F	5		0.078
MDC	701/80.7	701	Missouri R. nr.	Columbia	1989	CARP	BOONE	F	2		0.087
MDC	701/80.7		Missouri R. nr.		1989	CARP	BOONE	F	3		0.025
MDC	701/80.7	General regulation and breeze his	Missouri R. nr.	explained in promote income income to had a contract with proof the partie.		CH CAT	BOONE	F	2		0.025
MDC	356/112.7	granding appearance and the second	Missouri R. nr.	I ATTENDED TO SECURE AND ADDRESS OF THE PARTY OF THE PART	and the second of the second of the second	CH CAT	CLAY	Principalization of the	5	(col) marginipa desiris adplica (CR **) to the artifactor	0.082
A STATE OF THE PROPERTY OF THE	TO DESCRIPTION OF THE PROPERTY		Missouri R. nr.		and any - in the state of the state of the state of	CARP	CLAY	Super substitute de maiorite de la constitute de la const	5	To personal and delication in the contract of	0.056
MDC	356/112.7					CARP	BUCHANAN	W	4	Januaren 14 anna jurkija algentija kantalija	0.167
EPA/MDNR				St. Joseph, Mo.		CARP	COOPER	F	5		0.1
MDC	701/92.2		Missouri R. @		- President and the second section and the	Control to a boar some or make a deducted at	COOPER	F	and an a process of the same a second account		0.025
MDC	701/92.2		Missouri R. @			CH CAT	-E CONTRACTOR PLANT INCOME AND AREA OF THE PRINTING AND AREA OF THE PRINTING INCOME.	The state of the s	5		0.367
EPA/MDNR	1604/97.9		Missouri R. @		ومشاه ومستوليه والتراوي ووارا	CARP	GASCONADE	<u> </u>	3	Section and the section of the secti	
MDC	1604/97.9	1604	Missouri R. @	Hermann		SHSTUR	GASCONADE	<u>  E                                   </u>	<u> </u>	ing our main accommodated and the	0.285
MDC	1604/97.9	1604	Missouri R. @	Hermann		CARP	GASCONADE	F	5	Southern 15 - America and promote construction and	0.106
MDC	1604/97.9	1604	Missouri R. @	Hermann			GASCONADE	L F	1	kaja majulasanah bendirelihena error s	0.025
MDC	1604/97.9	1604	Missouri R. @	Hermann	1990	CH CAT	GASCONADE	<u>  F  </u>	5		0.192
MDC	1604/97.9		Missouri R. @		1990	PADDLE	GASCONADE	F	1		0.025
MDC	701/39.5			Jefferson City		CARP	COLE	F	5		0.025
MDC	701/39.5			Jefferson City	and a first of the second of	CH CAT	COLE	F	5		0.084
MDC	226/6.7		Missouri R. bl.		the Paris of the Country of the Paris Street, and the Paris Street, and the Paris Street, and the Paris Street,	FH CAT	PLATTE	F	5	of the semantic restorator spinor and more larger as	0.025
	a Spirital spirita in monator a propieta in majorita in Qui	esternitory and a market and register	Or Principles de Septimient Principles en marie en range que que para esta en esta principle de Septimient de Sept	and the control of th	" POST. M. WALL PARTY MINES	CARP	PLATTE	F	5	Andrews in the Antonion of the State of the	0.025
MDC	226/6.7	and the second of the second second	Missouri R. bl.	- Promise Printed September (* - 1/2) - 1/2 - 1/4 - 1/		CARP	SALINE				0.091
MDC	356/36.4		Missouri R. nr		confirmation, and process	the product in severe as received assessing	CLAY	F	5 5	Laplacing of military are selected to be	0.124
MDC	356/112.7		Missouri R. nr		- 1 - 30, - 2.1 - 4 - 4; 972, 19.00 4 6 6 1 10.1	CARP		F	5		0.079
MDC	356/112.7	THE PARTY NAMED AND ADDRESS OF THE	Missouri R. nr	rate for Children's company and construction of a large filtering the property of the property of the contract	to a in his Lie to contain princip	CH CAT	CLAY	ang an ilang was been not to the	district in product production and particular state of the	Schoolster below the below of	a Printer - Barrellander directed barberier ig
EPA/MDNF	المراب والمراب والمناطقين والمقامل والمراب والمرابع والمرابع			St. Joseph, Mo.		CARP	BUCHANAN	W	5		0.355
MDC	701/121.9		Missouri R. @		CHANGE AND INDICATED STATE OF THE REAL	CH CAT	HOWARD		apparreighy), mobaltadallad establicos da col	A CONTRACTOR OF THE PROPERTY O	0
NDEQ	226/NE		Missouri R. @	Rulo, NE		CH CAT	Language was supply and the second section of the second section of	F	5	0.035	0
NDEQ	226/NE		Missouri R. @	Rulo, NE	1992	CH CAT	The state of the s	F	4		ļ
NDEQ	226/NE		Missouri R. @		1992	CH CAT	and the section of th	F	4	ellerika untere salaren harren era errena era	Contraction become present
NDEQ	226/NE		Missouri R. @			CH CAT		F	4	damenta namenta namenta na	
MDC	356/112.7	Minute Wall report to the world from the principle	Missouri R. nr			CARP	CLAY		1		
	1604/97.9	Action of the Control of the World	Missouri R. @			CARP	GASCONADE	W	2	A character of the party and the same and th	0.05
COMMUNE	1 1004/97.9	1004	minoculi II. S	CIGHIRANIII		Contraction of the second of t	· Charles and the same and the		a programment and approximation	a (Copy) and the all the second consequent to which the	to a server was a same?

EPA/MDNR	226/80.5	226	Missouri R @	St. Joseph, Mo.	1993	CARP	BUCHANAN	W	3		0.23
	356/112.7		Missouri R. nr.		*************	CARP	CLAY	F	18	- John State Commission of the State of the	0.025
pate in the and a temperature described in the large country of particular	356/112.7	ment predict of vortex many	Missouri R. nr.	e razigen izenak eta berakeriaja diraktira i prazitetti tezenak etalenia masteria azilen	and with descriptions received	CARP	CLAY	F	18	Commission of the six of version And	0.161
وغوزياء والجوالاي المثل الواكم فيشعهم ومؤاهم ووحماها والمتناث والمراث	1604/97.9	F7V4AAAAA	Missouri R. @	etranjestematiska staar 1 kartentist, pt. Atriano Noval alauv. 31 zatustalaja.	بمعدده ودوراهمه أرجأ كإمامه	BASS	GASCONADE	W	17	0.05	0.05
BEST	1004/37.3	1004	IVIISSOUII II. 🔘	Homain	1000	DAGG	GAGOONADE		17	0.00	0.00
	1604/97.9	1604	Missouri R. @	Harmann	1005	CARP	GASCONADE	W	15	0.09	0.3
BEST	1004/37.3	1004	wissoun n. e	i icitilatiti	1990	OAH	CASOCIVADE		10	0.00	0.0
EPA/MDNR	256/110.0	256	Missouri R. bl.	Dira D	1005	CARP	CLAY	W		nderel statement server at throughout more	0.443
International services services	بدرأت يهجداه لدوادات معجب ويجدون والمرادات	errection-more	الدحداوما أياد الالاحدار وخيئا لكدار والطعطاء كدفونك كالراطرات الواطاعاتك الداملات	وأيدار الزارات والمراول معارضها الراو سنطين الأواسيطين والمطابع المراد المطابع فعد والمردون والزاران الرابي أوا	Section of the property of the	**************************************	🖟 registration of the property of the property of the property of the contract of the property of the contract of the contrac	W	5		0.079
EPA/MDNR	#9# # <sub>1</sub> ##9#  P##\$ C###\$\$\$\$\$\$\$\$##########\$\$\$#\$}##			St. Joseph, Mo.	いっしょうかいき ちゃくしゅうりんき チンクルム	CARP	BUCHANAN	F	5 5	0.00	CALIFOLD CONTRACTOR SECTION SE
	226/NE		Missouri R. @			CH CAT	OT OLLADI FO	· removed vilations and a significant		0.03	
	1604/28.0		Missouri R. @	e membraha and made med media mendered commenda mender, commenda ancienta e meja .			ST CHARLES	ΞĒ	13	0.113	
Section whereastern representations are not to	1604/28.0	Table of the second	Missouri R. @	Definition of the Comment of the American September 1964 and 1964 and 1964 and 1964 and 1964 and 1964 and 1964	racrament de paramente armani	STANDARD CONTRACTOR OF THE PROPERTY OF THE PRO	ST CHARLES	E	Committee of the State of Stat	0.105	
CONTRACTOR OF THE PROPERTY OF THE PROPERTY OF	1604/28.0		Missouri R. @			CARP	ST CHARLES	F	23	0.066	
Take attaining becomes an article to be being the best and a section of the last	1604/28.0	CONTRACTOR STATES	Missouri R. @	وسووه والمخطب والمتداوية والمحاركة والمناه فيتماع والمراج والمحاركة والمتعارب والمتعارب والمتحارك والمواوية والم	white the state of the same	CH CAT	ST CHARLES	F	24	0.054	enter transmitted incolor man.
The proper majoritation of the property of the	701/80.7	energes. Falle & Same and TV.	Missouri R. nr.	e transfer materiale et le crisis de la crisis de la crisis et le cris	of Proceeding Security 1. Variety	CARP	BOONE	F	14	0.054	Later As the collection in work to the collection in the later of the
	701/80.7	In any amount amount	Missouri R. nr.	an'ny tanàna mandria. Mandria ao	1996	BUF	BOONE	F	15	0.073	
	701/80.7		Missouri R. nr.		many and a second reservoir	SHSTUR	BOONE	F	25	0.018	
MDC	701/80.7	701	Missouri R. nr.	Columbia	1996	CARP	BOONE	F	14	0.059	وواسد فدوده أدملنا إلفعالاتها والإنجاسي
MDC	701/80.7	701	Missouri R. nr.	Columbia	1996	CARP	BOONE	F	17	0.053	
MDC	701/80.7	701	Missouri R. nr.	Columbia	1996	BUF	BOONE	F	10	0.066	0.025
MDC	701/80.7	701	Missouri R. nr.	Columbia	1996	SHSTUR	BOONE	E	5	0.096	0.354
	701/80.7		Missouri R. nr.		1996	CH CAT	BOONE	F	25	0.073	0.059
	226/80.5	d'abbette himmigrane i verbe	phone communication rates are a contract to the contract to th	St. Joseph, Mo.	***************************************	SHSTUR	BUCHANAN	F	7	0.039	0.183
	226/80.5			St. Joseph, Mo.	HARRIST PLANTER WILLIAM	CH CAT	BUCHANAN		25	0.019	The restance of the second of
The symmetry of the series, breaks a view of sever pulses and a	226/80.5			St. Joseph, Mo.		CARP	BUCHANAN	F F	17	0.017	forest and the property of the same of
	226/80.5			St. Joseph, Mo.			BUCHANAN	E	a nego water a subsequent	0.188	Carrier of court years and the court
	226/80.5			St. Joseph, Mo.	the research the Court of the New	CARP	BUCHANAN	F	28	0.032	
Change Indian California and a department of temporal and district at a	226/80.5			St. Joseph, Mo.	1996		BUCHANAN	F	6	0.077	STATES AND MANUEL BANKS HARRING
E AMERICA MARKET WAS A PARTICULAR BUT A	226/80.5		CANADA ANDREAS MARKET AND AND ARTHUR AND	St. Joseph, Mo.	1996	30 - 1000-000000 00 ALL WINDOWS ALL C.	BUCHANAN	F	11	0.054	
de annumento toto montre transcer un record va recordo de la Maria		India some makes and	principals i hariotheres i rudovissa en se seculta era custra perderit a br	recommendation to the second of the second o		SHSTUR	BUCHANAN	F	13	0.034	
	226/80.5			St. Joseph, Mo.	laterturbing started to	Contraction Comments of the Contract of the Co	BUCHANAN	E		0.299	
Commence and the second	226/80.5			St. Joseph, Mo.		SHSTUR	CLAY	W	nomentarion de la companie de la co	0.233	1.56
EPA/MDNR			Missouri R. bl.			CARP			4 3		Control for Control alone and the
EPAMDNR			Missouri R. bl.			CARP	CLAY	W F	ACTEM TOWARD TOWARD TO VERY TO A TOP		1.26
	226/80.5			St. Joseph, Mo.		CARP	BUCHANAN		25	0.04	
	226/80.5			St. Joseph, Mo.	or a ter Manual contact	CH CAT	BUCHANAN	F	15	0.024	
EPA/MDNR	مرأوا والمرابعة بالمربعة يشاعه لإنجالها للمائية			St. Joseph, Mo.		CARP	BUCHANAN	<u>W</u>	4		0.092
PRINCIPLE PRINCI	1604/47.5			Weldon Spring CA	ALTERNATION OF THE PARTY OF	CARP	ST LOUIS	F	25	0.032	
	701/80.7		Missouri R. nr.	demander of the Martin on a defined a contract of the contract		FH CAT	BOONE	AND THE PROPERTY OF THE PARTY O	15	0.005	Count total Anna A tricked in the party
EPA/MDNR	ment of the property of the property of the	356	Missouri R. bl.	Blue R.	ann anns an an gheathair	CARP	CLAY	W	5	Wintenters or construction as	0.126
EPA/MDNR		CARNEL MARKETAN MAN	Missouri R. bl.	and the second process of the second party and the	consequences and an experience	CARP	CLAY	W	5		0.22
a tennes of any street as not be arranged to the	701/80.7	water and the same of the same of	Missouri R. nr.	COMMENTAL PROPERTY COMMENTS AND A COMMENTAL PROPERTY OF A		CARP	BOONE	F	25	0.042	Spirit was marked to the said and and
EPA/MDNR	226/80.5			St. Joseph, Mo.		CARP	BUCHANAN	W	5		0.187
MDC	1604/47.5	1604	Missouri R. @	Weldon Spring CA	2000	FH CAT	ST CHARLES	F	16	0.016	0.053
MDC	226/93.4	226	Missouri R. bl.	Nodaway R.	2000	CH CAT	ANDREW	-	15	0.009	
	226/80.5	226	Missouri R. @	St. Joseph, Mo.	2000	CARP	BUCHANAN	F	10	0.092	0.029
	226/80.5			St. Joseph, Mo.	2000	CARP	BUCHANAN	F	15	0.04	0.022
EPA/MDNR			Missouri R. bl.			CARP	CLAY	W	5		0.802
<b>EPA/MDNR</b>	and the state of t			St. Joseph, Mo.		CARP	BUCHANAN	·W	5 5		0.154
EPA/MDNR		**********	Commence and the commence of t	St. Joseph, Mo.		CARP	BUCHANAN	W	5		0.262
fronten untransministratura accominant	1604/47.5	that we said her place and been	Conference or compact and sport to be belong to be a present to the speciment of the speciments of the	Weldon Spring CA	and the second second second	CARP	ST CHARLES	F	15	0.04	0.052
( ) A COMPANY OF THE PROPERTY AND ADDRESS OF THE PARTY OF	1604/47.5			Weldon Spring CA	THE PROPERTY OF STREET	FH CAT	ST CHARLES	F	17	0.028	- ja II versedravani adaveresi
	701/80.7		Missouri R. nr.		الرجوة ورمد موسوماتها لأخاجم البعارة ا	CARP	BOONE	F	26	0.018	
	356/23.4		Missouri R. @			SHSTUR		F	5	0.037	
	356/23.4		Missouri R. @			SHSTUR		F	5	0.024	
	356/23.4		Missouri R. @			SHSTUR		F F	5		0.165
	701/19.7		Missouri R. @				CALLAWAY	E	1	0.105	
Applications been made and purious construction communications of		strates a without of an	Sala ha balant an ann seavann na a th' na cealaite de seavan d'anti-	Chefferen attage antique atten a fer en Americal States for the fertane ?			CALLAWAY	E	يجوها بحرارت هواء ويهذبوها والاوحاء فسلامك شبار والمعاهدين	0.103	ally recover the Coleran drive
Printerman spiritual System (remains part of a big bar of	701/19.7		Missouri R. @ Missouri R. @		A いってき こまりゃくの うじょうかい たっこ	ing mitracking of magnitudes of a 1% of the high sample by the	ergy was a filter on a state of the country of the		1	Care on the series in the first and color and color and other way to	0.393
	701/19.7	701	iviissouri H. @	wokane	2004	HOLOUC	CALLAWAY	F	5	J 0.025	. 0.587

Total Maximum Daily Load for Missouri River - Appendix

								. !		and the second	d and the language of the second
MDC	701/19.7	701	Missouri R.	@ Mokane	2004	SHSTUR	CALLAWAY	F	5	0.049	rds anny meninerations at a
provided broken, or stranger of the country benefit to	701/19.7	701	Missouri R.	@ Mokane	2004	SHSTUR	CALLAWAY	F	5	0.093	0.807
MDC	701/19.7	701	Missouri R.	@ Mokane	2004	SHSTUR	CALLAWAY	E	1	0.086	Parameter community (c)
Sanita dimendentale del camanes values de la camanes de	701/19.7	701	Missouri R.	@ Mokane	2004	SHSTUR	CALLAWAY	E	المارية والمارية المارية	0.056	0.454
MDC	356/87.7	356	Missouri R.	@ Napoleon	2004	SHSTUR	LAFAYETTE		15	0.05	**************************************
MDC	356/87.7			@ Napoleon	2004	SHSTUR	LAFAYETTE		6	0.39	4.01
	226/99.6		Missouri R. Access	@ Nodaway Island	2004	SHSTUR	ANDREW	E	1	0.133	Greenera encasarante y la decemb
MDC	226/99.6	226	Missouri R. Access	@ Nodaway Island	2004	SHSTUR	ANDREW		5	0.031	0.22
MDC	226/99.6	226	Missouri R. Access	@ Nodaway Island	2004	SHSTUR	ANDREW		5	0.022	0.23
MDC	226/99.6	226	Missouri R. Access	@ Nodaway Island	2004	SHSTUR	ANDREW	E	1	0.193	0.532
MDC	226/99.6	226	Missouri R. Access	@ Nodaway Island	2004	SHSTUR	ANDREW	E	1	0.077	0.758
MDC	226/99.6	226	Missouri R. Access	@ Nodaway Island	2004	SHSTUR	ANDREW	F	5	0.038	0.422
MDC	226/99.6	226	Missouri R. Access	@ Nodaway Island	2004	SHSTUR	ANDREW	E	1	0.14	0.867
MDC	226/99.6	226	Missouri R. Access	@ Nodaway Island	2004	SHSTUR	ANDREW	E	The control of the co	0.103	0.726
MDC	1604/47.5	1604	Missouri R.	@ Weldon Spring CA	2004	SHSTUR	ST CHARLES	S	5	0.036	the printed and a second second and a second
MDC	1604/47.5	1604	Missouri R.	@ Weldon Spring CA	2004	SHSTUR	ST CHARLES	E	inkananik wasaningense misasa sa	0.114	DOLLAR COMMENTERS CONTRACT
MDC	1604/47.5			@ Weldon Spring CA		SHSTUR	ST CHARLES	E	1	0.07	
MDC	1604/47.5		Property of the party of the same of the s	@ Weldon Spring CA	2004	SHSTUR		F	5	0.058	0.431
Contraction of the second seco	1604/47.5	1604	Missouri R.	@ Weldon Spring CA	√ 2004	SHSTUR	ST CHARLES	F	5	0.058	0.739
And the second s	1604/47.5	1604	Missouri R.	@ Weldon Spring CA	2004	SHSTUR	- Compression of Statement and a series of the majority and a series of the series of	. E		0.113	a distribution to a part of a
EPA/MDNR	356/119.2	356	Missouri R.	bl. Blue R.	2005	C CARP	JACKSON	j olje o kanesomen svoro	5	annicologica manerel esticione estic	0.58
EPA/MDNR	226/80.5	226	Missouri R.	@ St. Joseph, Mo.	2005	C CARP	BUCHANAN	W	5	Language were determined	0.049

Note: Site = WBID/number of miles from mouth; u = urban; r = rural; # in sample = the number of fish in each "sample".

Type = what form of the fish is evaluated:

W =the whole fish

F =the fillet of the fish only

E =the fish eggs only

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